

*Please provide the following information, and submit to the NOAA DM Plan Repository.*

**Reference to Master DM Plan (if applicable)**

*As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.*

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

**1. General Description of Data to be Managed****1.1. Name of the Data, data collection Project, or data-producing Program:**

2010 FEMA Lidar: Ozaukee County (WI)

**1.2. Summary description of the data:**

The Ozaukee AOI consists of one area encompassing the entire county. Ground Control is collected throughout the AOI for use in the processing of LiDAR data to ensure data accurately represents the ground surface. QA/QC checkpoints, (FVA and CVA - see Ground Control process step for further information) also collected throughout the AOI, are used for independent quality checks of the processed LiDAR data.

LiDAR acquisition products include Pre- and Post- flight reports which contain information on the flightlines, equipment parameters, and other pertinent acquisition details. The LiDAR Point Cloud product consists of tiles of LAS points which are partially classified such that the bare earth points can be calibrated to the ground surface and tested via the independent QC to ensure the ground surface is accurately represented.

The LiDAR processing product consists of LAS points which are fully classified with the bare earth points tested via the independent QC to ensure the ground surface is accurately represented.

**1.3. Is this a one-time data collection, or an ongoing series of measurements?**

One-time data collection

**1.4. Actual or planned temporal coverage of the data:**

2010-10-31 to 2010-11-23

**1.5. Actual or planned geographic coverage of the data:**

W: -88.060711, E: -87.787129, N: 43.547961, S: 43.190498

**1.6. Type(s) of data:**

*(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)*  
las

**1.7. Data collection method(s):**

*(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy,*

*research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)*

**1.8. If data are from a NOAA Observing System of Record, indicate name of system:**

**1.8.1. If data are from another observing system, please specify:**

**2. Point of Contact for this Data Management Plan (author or maintainer)**

**2.1. Name:**

NOAA Office for Coastal Management (NOAA/OCM)

**2.2. Title:**

Metadata Contact

**2.3. Affiliation or facility:**

NOAA Office for Coastal Management (NOAA/OCM)

**2.4. E-mail address:**

coastal.info@noaa.gov

**2.5. Phone number:**

(843) 740-1202

**3. Responsible Party for Data Management**

*Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.*

**3.1. Name:**

**3.2. Title:**

Data Steward

**4. Resources**

*Programs must identify resources within their own budget for managing the data they produce.*

**4.1. Have resources for management of these data been identified?**

**4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):**

**5. Data Lineage and Quality**

*NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.*

### 5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible

*(describe or provide URL of description):*

#### Process Steps:

- 2010-01-01 00:00:00 - GPS based surveys were utilized to support both processing and testing of LiDAR data within FEMA designated Areas of Interest (AOIs). Geographically distinct ground points were surveyed using GPS technology throughout the AOIs to provide support for three distinct tasks. Task 1 was to provide Vertical Ground Control to support the aerial acquisition and subsequent bare earth model processing. To accomplish this, survey-grade Trimble R-8 GPS receivers were used to collect a series of control points located on open areas, free of excessive or significant slope, and at least 5 meters away from any significant terrain break. Most if not all control points were collected at street/road intersections on bare level pavement. Task 2 was to collect Fundamental Vertical Accuracy (FVA) checkpoints to evaluate the initial quality of the collected point cloud and to ensure that the collected data was satisfactory for further processing to meet FEMA specifications. The FVA points were collected in identical fashion to the Vertical Ground Control Points, but segregated from the point pool to ensure independent quality testing without prior knowledge of FVA locations by the aerial vendors. Task 3 was to collect Consolidated Vertical Accuracy (CVA) checkpoints to allow vertical testing of the bare-earth processed LiDAR data in different classes of land cover, including: Open (pavement, open dirt, short grass), High Grass and Crops, Brush and Low Trees, Forest, Urban. CVA points were collected in similar fashion as Control and FVA points with emphasis on establishing point locations within the predominant land cover classes within each AOI or Functional AOI Group. In order to successfully collect the Forest land cover class, it was necessary to establish a Backsight and Initial Point with the R8 receiver, and then employ a Nikon Total Station to observe a retroreflective prism stationed under tree canopy. This was necessary due to the reduced GPS performance and degradation of signal under tree canopy.

- 2010-01-01 00:00:00 - The R-8 receivers were equipped with cellular modems to receive real-time correction signals from the Keystone Precision Virtual Reference Station (VRS) network encompassing the Region 1 AOIs. Use of the VRS network allowed rapid collection times (~3 minutes/point) at 2.54 cm (1 inch) initial accuracy.

All points collected were below the 8cm specification for testing 24cm, Highest category LiDAR data. To ensure valid in-field collections, an NGS monument with suitable vertical reporting was measured using the same equipment and procedures used for Control, FVA and CVA points on a daily basis. The measurement was compared to the NGS published values to ensure that the GPS collection schema was producing valid data and as a physical proof point of quality of collection. Those monument measurements are summarized in the Accuracy report included in the data delivered to FEMA. 20 FVA points and 15 additional CVA points across the group of AOIs were collected. 20 FVA points are necessary to

allow testing to CE95 ? 1 point out of 20 may fail vertical testing and still allow the entire dataset to meet 95% accuracy requirements. In similar fashion, 20 CVA points are necessary to test to CE95 as discussed above. 15 CVA points were collected with the intention at the outset that 5 of the collected FVAs would perform double-duty as Open-class CVA points, to total 20 CVAs per AOL. The following software packages and utilities were used to control the GPS receiver in the field during data collection, and then ingest and export the collected GPS data for all points: Trimble Survey Controller, Trimble Pathfinder Office. The following software utilities were used to translate the collected Latitude/Longitude Decimal Degree HAE GPS data for all points into Latitude/Longitude Degrees/Minutes/Seconds for checking the collected monument data against the published NGS Datasheet Lat/Long DMS values and into UTM NAD83 Northings/Eastings: U.S. Army Corps of Engineers CorpsCon, National Geodetic Survey Geoid09 NAVD88. MSL values were determined using the most recent NGS-approved geoid model to generate geoid separation values for each Lat/Long coordinate pair. In this fashion, Orthometric heights were determined for each Control, FVA and CVA point by subtracting the generated Geoid Separation value from the Ellipsoidal Height (HAE) for publication and use as MSL NAVD88(09).

- 2010-01-01 00:00:00 - Using a Optech Gemini LiDAR system, 56 flight lines of highest density (Nominal Pulse Spacing of 1.0m) were collected over the Ozaukee area. A total of five missions were flown: November 11, 2010, November 15, 2010, 2 on November 16, 2010, November 23, 2010. Seven airborne global positioning system (GPS) base stations were used to support the LiDAR data acquisition: WIM5, SHAN, CHON, FOLA, WEBE, RASN, SIWI. Coordinates are available in the Post-Flight Aerial Acquisition Report.

- 2011-01-01 00:00:00 - Raw airborne GPS and IMU data were extracted from Applanix CARD. The GPS data was differentially processed in PosGPS and integrated with the IMU data in PosPAC. The GPS/IMU data is processed in Applanix to derive a smoothed best estimate of trajectory (SBET). The SBET was used to reduce the LiDAR slant range measurements to derive the Return measurement for each LiDAR pulse for all LiDAR pulses within for each flight line. The coverage was imported into TerraScan and tiled into 1500m x 1500m tiles. An initial accuracy assessment is done using the ground point survey data. The data then is classified to extract a bare earth digital elevation model (DEM). Once all project data was imported and classified, the survey ground control data was imported again and calculated against the LAS Class 2 (Ground) data for an accuracy assessment. As a QC measure, a routine was used to generate accuracy statistical reports by comparison among LiDAR points, ground control, and triangulated irregular networks (TIN). Any systematic bias in the data is removed to meet or exceed the vertical accuracy requirements.

- 2011-01-01 00:00:00 - The calibrated and filtered LiDAR point cloud was hand checked for accuracy. All points were placed in one of the following categories: 1 Unclassified, 2 Ground, 7 Noise, and 12 Overlap Points. Model Key points were then generated from the Ground points and placed in Category 8. Requested elevation

values to were then provided to CompassData for their evaluation of the Consolidated Vertical Accuracy (CVA).

- 2016-05-24 00:00:00 - The NOAA Office for Coastal Management (OCM) received the files in laz format from USGS via an FTP online repository. The files contained lidar elevation and intensity measurements. The data were in UTM Zone 16 N, NAVD88 (orthometric) heights in meters. OCM performed the following processing for data storage and Digital Coast provisioning purposes: 1. The data were converted from UTM coordinates to geographic coordinates. 2. Erroneous elevations were removed. 3. The data were converted from NAVD88 (orthometric) heights in meters to GRS80 (ellipsoid) heights in meters using Geoid 09. 4. The LAS data were sorted by latitude and the headers were updated.

**5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:**

**5.2. Quality control procedures employed (describe or provide URL of description):**

## 6. Data Documentation

*The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.*

**6.1. Does metadata comply with EDMC Data Documentation directive?**

No

**6.1.1. If metadata are non-existent or non-compliant, please explain:**

Missing/invalid information:

- 1.7. Data collection method(s)
- 3.1. Responsible Party for Data Management
- 4.1. Have resources for management of these data been identified?
- 4.2. Approximate percentage of the budget for these data devoted to data management
- 5.2. Quality control procedures employed
- 7.1. Do these data comply with the Data Access directive?
  - 7.1.1. If data are not available or has limitations, has a Waiver been filed?
  - 7.1.2. If there are limitations to data access, describe how data are protected
- 7.4. Approximate delay between data collection and dissemination
- 8.1. Actual or planned long-term data archive location
- 8.3. Approximate delay between data collection and submission to an archive facility
- 8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?

**6.2. Name of organization or facility providing metadata hosting:**

NMFS Office of Science and Technology

**6.2.1. If service is needed for metadata hosting, please indicate:****6.3. URL of metadata folder or data catalog, if known:**

<https://www.fisheries.noaa.gov/inport/item/50191>

**6.4. Process for producing and maintaining metadata**

*(describe or provide URL of description):*

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive: [https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC\\_PD-Data\\_Documentation\\_v1.pdf](https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf)

**7. Data Access**

*NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.*

**7.1. Do these data comply with the Data Access directive?**

**7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?**

**7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:**

**7.2. Name of organization of facility providing data access:**

NOAA Office for Coastal Management (NOAA/OCM)

**7.2.1. If data hosting service is needed, please indicate:****7.2.2. URL of data access service, if known:**

<https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=5042>  
[https://coast.noaa.gov/htdata/lidar1\\_z/geoid18/data/5042](https://coast.noaa.gov/htdata/lidar1_z/geoid18/data/5042)

**7.3. Data access methods or services offered:**

This data can be obtained on-line at the following URL:

<https://coast.noaa.gov/dataviewer/#/lidar/search/where:ID=5042>;

**7.4. Approximate delay between data collection and dissemination:**

**7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:**

**8. Data Preservation and Protection**

*The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.*

**8.1. Actual or planned long-term data archive location:**

*(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)*

**8.1.1. If World Data Center or Other, specify:****8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:****8.2. Data storage facility prior to being sent to an archive facility (if any):**

Office for Coastal Management - Charleston, SC

**8.3. Approximate delay between data collection and submission to an archive facility:****8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?**

*Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection*

**9. Additional Line Office or Staff Office Questions**

*Line and Staff Offices may extend this template by inserting additional questions in this section.*